UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/676,042	10/02/2003	Mark H. Shipton	117313	6932

25944 7590 07/20/2007

OLIFF & BERRIDGE, PLC
P.O. BOX 19928
ALEXANDRIA, VA 22320

EXAMINER	
AUSTIN, AARON	
ART UNIT	PAPER NUMBER
1775	

MAIL DATE	DELIVERY MODE
07/20/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/676,042	SHIPTON ET AL.	
	Examiner	Art Unit	
	Aaron S. Austin	1775	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 May 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7 and 15-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7 and 15-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-7 and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfaendtner et al. (US 6,676,992) in view of PCT International Application No. WO 94/18359 (WO '359).

Pfaendtner et al. teach a method of forming a platinum aluminide diffusion barrier layer on turbine engine components (column 3, lines 60-65, column 6, lines 21-29). The turbine engine component may be any operable material (column 3, lines 66-67). Formation of the barrier layer includes applying particulate platinum and particulate aluminum in combination with an organic carrier (column 2, lines 29-49). A reaction treatment forms the aluminide by subjecting the particles to a temperature of from about 1200 F (649 °C) to about 2100 F in a time sufficient for reaction between the particles to form the diffusion barrier layer (column 8, lines 44-65).

Pfaendtner et al. teach the turbine engine component may be any operable material (column 3, lines 66-67), but do not teach the substrate as being a titanium alloy.

WO '359 discloses thermal methods of forming a stable intermetallic diffusion barrier on metallic substrates, such as turbine engines (page 1, lines 1-10), wherein the

substrate may be a titanium alloy (page 5, Example 1). Therefore, as WO '359 clearly teaches titanium alloys are suitable as substrates for turbine engine components upon which diffusion barrier layers are formed, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to form the diffusion barrier layer of Pfaendtner et al. on a titanium alloy substrate.

Regarding claim 1, the temperature of *about* 649 °C is considered to substantially approximate the claimed value of *about* 600 °C. The temperature of 649 °C is substantially close to that of the instant claims such that one of ordinary skill would have expected no patentable distinction between the temperature of WO '359 and the claimed temperature.

Regarding claim 2, the reaction treatment takes place in an inert atmosphere (column 8, line 46).

Regarding claim 3, the coating may be applied in multiple coating steps (column 8, lines 23-24).

Regarding claim 4, the particles and the organic carrier may be applied as a mixture or separately (column 7, line 60 to column 8, line 12).

Regarding claim 5, the organic carrier may include volatile and non-volatile components and serves to anchor the particles for the reaction treatment (column 2, lines 35-49 and column 6, lines 38-65).

Regarding claims 6-7, the aluminum containing particles may have a diameter from about 5 to about 50 micrometers (column 6, line 35).

Regarding claim 15, the diffusion barrier layer has a substantially uniform thickness (column 8, lines 13-26).

Regarding claim 16, aluminide diffusion barrier layers thinner than 0.0015 inches (38.1 microns) are contemplated but not specifically taught (column 8, line 64). However, WO '359 teaches a preferable thickness for a diffusion barrier layer is between 0.1-10 micrometers (page 4, lines 8-11). Therefore, as WO '359 teaches the claimed range is a preferable thickness for a diffusion barrier layer and as Pfaendtner et al. clearly teach aluminide diffusion barrier layers thinner than 0.0015 inches (38.1 microns) are contemplated, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to form the diffusion barrier layer of Pfaendtner et al. in a thickness of between 0.1-10 micrometers.

Regarding claim 17, application to numerous turbine components having a surface area of at least 200 cm2 is taught (column 3, lines 60-65).

Regarding claim 18, the term "aerospace component" is considered intended use.

Claims 1-7 and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over PCT International Application No. WO 94/18359 (WO '359) in view of Pfaendtner et al. (US 6,676,992).

WO '359 discloses thermal methods of forming a stable intermetallic diffusion barrier on metallic substrates, such as turbine engines (page 1, lines 1-10). The diffusion barrier is formed by depositing a first layer of a first metal on the substrate,

depositing a second layer of a second metal on the first layer, and performing a reaction treatment which causes the first and second metals to combine and form the diffusion barrier layer (page 3, lines 2-10). The heating step of the reaction treatment involves raising the deposited metals to a sufficiently high temperature to initiate the exothermic reaction necessary to form the intermetallic species in an inert vacuum environment (page 3, lines 31-38). The diffusion barrier may comprise platinum as the first metal and aluminum as the second metal applied to a titanium alloy (see Example 1 on page 5). Preferably the thickness of the diffusion barrier layer is between 0.1-10 micrometers (page 4, lines 8-11). Formation of the metallic layer may be through use of RF biased DC sputtering of particulate metal (page 5, lines 21-23). The thickness of the diffusion barrier layer thereby limits the effective diameter of the metallic particles to necessarily fall within the claimed ranges.

WO '359 does not disclose the use of an organic carrier or the temperature range claimed.

Regarding the organic carrier, Pfaendtner et al. teach use of an organic binder aids in holding particles together prior to diffusion treatment if formation of a platinum aluminide as discussed above (column 2, lines 35-39). Therefore, as Pfaendtner et al. clearly teach organic binders aid in holding particles together prior to diffusion treatment if formation of a platinum aluminide for coating turbine engine components, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to use an organic binder in the application of the particles for formation of an aluminide coating as taught by WO '359.

Regarding the temperature range, WO '359 teach application of heat involving raising the deposited metals to a sufficiently high temperature to initiate the exothermic reaction necessary to form the intermetallic species in an inert vacuum environment (page 3, lines 31-38). A specific range is not taught, however the examples show application of heat at a temperature of 700° C or greater. However, Pfaendtner et al. teach a temperature of from about 1200 F (649 °C) to about 2100 F is sufficient for forming an aluminide layer due to reaction between the particles (column 8, lines 44-65). Therefore, as Pfaendtner et al. clearly teach a temperature of from about 1200 F (649 °C) to about 2100 F is sufficient for forming an aluminide layer due to reaction between the particles, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to interpret the teachings of WO '359 (page 3, lines 31-38) as including the temperature range of Pfaendtner et al.

The temperature of *about* 649 °C is considered to substantially approximate the claimed value of *about* 600 °C. The temperature of 649 °C is substantially close to that of the instant claims such that one of ordinary skill would have expected no patentable distinction between the temperature of WO '359 and the claimed temperature. Further, it would have been obvious to one having ordinary skill in the art at the time of the invention to adjust the temperature for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 5, the organic carrier of Pfaendtner et al. may include volatile and non-volatile components and serves to anchor the particles for the reaction treatment (column 2, lines 35-49 and column 6, lines 38-65).

Response to Arguments

Applicant's arguments filed 5/4/07 have been fully considered but they are not persuasive.

First, Applicant argues neither Pfaendtner nor WO '359 teach, nor would they suggest, the feature of applying a temperature in the range of about 200 °C to about 600 °C as recited in claim 1. More specifically, Applicant argues the prior Office Action proffers no objective evidence in support of the assertion that there is no patentable distinction between the claimed range and that taught by the art of 1200 F (649 °C) to 2100 F. However, as noted in the rejection, the temperature of *about* 649 °C is considered to substantially approximate the claimed value of *about* 600 °C. Applicant has failed to establish these two values are not sufficiently similar that one of ordinary skill in the art would expect substantially different results using one temperature over the other. Further, Applicant has not supplied arguments or evidence that would support the conclusion that the claimed method conducted at *about* 600 °C holds a non-obvious advantage over a method at *about* 649 °C.

Applicant attempts to differentiate the claimed temperature with an upper limit of *about* 600 °C from that of the prior art, a lower limit of *about* 649 °C, by examining the relationship between titanium and temperature. In particular, it is suggested that an

oxide film porous to oxygen is formed above temperatures of approximately 400 °C on titanium metals and that elevated temperatures result in an increased risk of oxidation damage to titanium alloys. However, this argument fails to establish a functional difference between *about* 600 °C and *about* 649 °C.

Second, in response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, with respect to the first rejection under 35 USC 103, WO '359 clearly teaches titanium alloys are suitable as substrates for turbine engine components upon which diffusion barrier layers are formed. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to form the diffusion barrier layer of Pfaendtner et al. on a titanium alloy substrate. With respect to the second rejection under 35 USC 103, Pfaendtner et al. clearly teach a temperature of from about 1200 F (649 °C) to about 2100 F is sufficient for forming an aluminide layer due to reaction between the particles. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to interpret the teachings of WO '359 (page 3, lines 31-38) as including the temperature range of Pfaendtner et al.

Third, Applicant argues there would not be an expectation of success in combining the references as set forth in the rejections. In particular, Applicant argues one of ordinary skill in the art would not have had a reasonable expectation of success in combining Pfaendtner with WO '359 at least because the combination of the applied references would not have provided the skilled artisan with the requisite features as recited in claim 1. This argument is unconvincing as the presence or absence of features does not in and of itself establish an expectation of success. In setting forth this argument, Applicant has failed to point to any features that could limit the success of the combined references.

Applicant furthers the argument that there is not expectation of success for the combined references by pointing to the a multitude of factors taken into account by Applicant to produce a product designed through careful consideration of these independently variable factors (e.g., high inherent reactivity of an underlying substrate, the presence of an oxide film, the uncontrollability of the oxide film due to the ease of it's automatic formation, and the variability in diffusion properties of the oxide film). However, Applicant has failed to establish these factors result in a patentable distinction between the method taught by the references using a temperature of *about* 649 °C and the method claimed having a temperature of *about* 600 °C.

To better differentiate between the temperatures of *about* 600 °C and *about* 649 °C, it is suggested that a declaration or other showing of evidence may be used to establish a patentable distinction between the use of one temperature over the other.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron S. Austin whose telephone number is (571) 272-8935. The examiner can normally be reached on Monday-Friday: 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on (571) 272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ASA

JOHN J. ZIMMERMAN
PRIMARY EXAMINER